Case 3090

Musca arcuata and *M. festiva* Linnaeus, 1758 (currently *Chrysotoxum arcuatum* and *C. festivum*) and *M. citrofasciata* De Geer, 1776 (currently *Xanthogramma citrofasciatum*) (Insecta, Diptera): proposed conservation of usage of the specific names by the designation of neotypes for *M. arcuata* and *M. festiva*

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Abstract. The purpose of this application is to conserve the long prevailing usage of the names of three hoverflies, *Chrysotoxum arcuatum* (Linnaeus, 1758), *Chrysotoxum festivum* (Linnaeus, 1758) and *Xanthogramma citrofasciatum* (De Geer, 1776). There has been confusion in the literature since 1982, when lectotypes (which may not have been syntypes) were designated for *C. arcuatum* and *C. festivum*. These designations had the effect of transferring the name *arcuatum* to *C. festivum* auct. and *festivum* to *X. citrofasciatum* auct.; the name *C. fasciatum* (Müller, 1764) was introduced for *C. arcuatum* auct. These changes have been followed by some but not all authors, and in accordance with Article 75.6 of the Code it is proposed that the long established usage of the names should be conserved by the designation of neotypes for *C. arcuatum* and *C. festivum*.

Keywords. Nomenclature; taxonomy; Diptera; SYRPHIDAE; hoverflies; *Chrysotoxum*; *Xanthogramma*; *Chrysotoxum arcuatum*; *Chrysotoxum fasciatum*; *Chrysotoxum festivum*; *Xanthogramma festivum*; *Xanthogramma citrofasciatum*.

1. The subject of this application is the need to resolve confusion which has resulted from the transfer of specific names between well-known and widespread species in the much studied group known as hoverflies (Diptera, SYRPHIDAE). The species concerned are now placed in the genera *Chrysotoxum* Meigen, 1803 (type species *Musca bicincta* Linnaeus, 1758) and *Xanthogramma* Schiner, 1860 (type species *Syrphus ornatus* Meigen, 1822). Both genera comprise conspicuous brightly marked yellow and black wasp mimics and are superficially similar to each other. The most obvious difference is in the antennal structure: the antennae are longer than the head and black in colour in the *Chrysotoxum* species considered here, while they are shorter than the head and bright orange in the *Xanthogramma* species.

2. This case concerns three species, which have long been known as *Chrysotoxum arcuatum* (Linnaeus, 1758), *C. festivum* (Linnaeus, 1758) and *Xanthogramma*

citrofasciatum (De Geer, 1776). This stable nomenclature has become confused following a paper by Thompson, Vockeroth & Speight (1982). Following an examination of specimens in the Linnaeus collection at the Linnean Society of London, these authors designated lectotypes of *Musca arcuata* and *M. festiva*, nominal species established by Linnaeus (1758). These designations have the effect of transferring the specific name of *Chrysotoxum arcuatum* to *C. festivum* auct. and that of *C. festivum* to *Xanthogramma citrofasciatum* (so that '*festivum*' is transferred to another genus); *C. arcuatum* auct. was renamed *C. fasciatum* (Müller, 1764). These transfers cause much confusion in the names of the three species, and it is proposed that stability should be restored by the designations of neotypes for *M. arcuata* and *M. festiva* in the long-understood senses of those names.

3. Linnaeus (1758) described two species, *Musca arcuata* (p. 592) and *M. festiva* (p. 593) which have long been regarded as belonging to the genus *Chrysotoxum*. De Geer (1776, p. 118) described *M. citrofasciata*, which has consistently been placed in *Xanthogramma*. The identity of the Linnaean names has, however, been placed in doubt following the revision of the specimens in the Linnaeus collection in London by Thompson, Vockeroth & Speight (1982, pp. 151–2, 155–6). As they pointed out, the application of these names throughout the 20th century has followed the interpretation by Verrall (1901, pp. 450, 645, 650), who himself followed Haliday (1851, pp. 140–141) and subsequent 19th century authors. Thompson et al. listed some earlier authors from Fabricius (1775, pp. 767, 769) onwards, who differed in applying the name *arcuata* Linnaeus to *Chrysotoxum festivum* auct. and *festiva* Linnaeus to *Xanthogramma citrofasciatum* (De Geer, 1776). From a study of the Linnaeus collections they came to the same conclusions as these latter authors and designated lectotypes which resulted in the transfer of the names *arcuatum* and *festivum* to these species. They also applied the name *Musca fasciata* Müller (1764, p. 85) to *Chrysotoxum arcuatum* of authors, although without giving any justification for the use of this name.

4. The name *Musca arcuata* has been variously applied, but always in the genus *Chrysotoxum*. Verrall (1901, p. 647) indicated that it had in the past been erroneously applied to *C. cautum* (Harris, 1776), which is not recorded from Sweden, but that it correctly applied to a more northern species to which he assigned the name. On p. 651 he noted that *arcuatum* had also been associated with the species to which he applied the name *C. festivum*, probably because the latter has arched bows on the abdomen. The specimen which they designated lectotype of *Musca arcuata* Linnaeus was stated by Thompson et al. (1982, p. 155) to bear the Linnaean name label '*arcuata* 28' and to fit Linnaeus's description better than did *C. arcuatum* of authors, in having four yellow bands on the abdomen while *C. arcuatum* auct. has an additional broad apical band on each segment. This identification of *M. arcuata* may be historically correct but the resultant transfer of the specific name to *C. festivum* auct. has resulted in unnecessary confusion, compounded by the simultaneous change in application of the name *festivum*, whenever these names are encountered in the literature.

5. The application by Thompson et al. of the specific name of *Musca fasciata* Müller, 1764 (p. 85) to *C. arcuatum* of authors is also controversial. As no justification was evidently thought necessary, it was presumably selected as the next most senior supposed synonym. Peck (1988, p. 56) has listed seven available junior synonyms of *C. arcuatum* auct., but *fasciatum* was not included since this was listed

by her (p. 45) as a junior synonym of *Sphaerophoria scripta* (Linnaeus, 1758, p. 594). Type specimens of *Musca fasciata* are unlikely to exist as Müller's collection was destroyed in 1801 (see Thompson & Pont (1994, p. 36) and Evenhuis (1997, p. 555)). Use of Müller's name *fasciata* in *Chrysotoxum* cannot therefore be unequivocally supported or confirmed.

6. The lectotype of *Musca festiva* was stated by Thompson et al. (1982, p. 155) to bear the Linnaean label '*festiva* 33'; two other (unlabelled) specimens were considered probable syntypes. All three are males of *Xanthogramma citrofasciatum* (De Geer, 1776) as long understood. Thompson et al. listed some early authors who had identified *festiva* with *citrofasciata*, noting that the identification of *M. festiva* as a *Chrysotoxum* species by Haliday (1851, p. 141) stemmed from some other early authors from Scopoli (1763, p. 355) onwards. Apart from the specimens in the Linnean Society collections, the argument by Thompson et al. that *Musca festiva* Linnaeus applied to a *Xanthogramma* species was principally based on part of the Latin description of festiva, which reads 'antennae nigrae, capite longiores ...'; Thompson et al. translated this as 'antennae black, head longer ...'. They ignored the reference to colour, which should have cast strong doubt on the identification, but considered that the description indicated the species to have short antennae and thus not be a *Chrysotoxum* species. They also overlooked the accurate interpretation of the Latin by Verrall (1901, p. 647), who quoted it in support of *Musca festiva* being a *Chrysotoxum*. The word 'longiores' is plural and therefore qualifies antennae rather than head, and the word 'capite' is in the ablative case, meaning 'than the head'. Thus the phrase is correctly translated 'antennae black, longer than the head' as indicated by Iliff (1995, p. 9). Clearly, this description refers to a species with long black antennae such as those of *Chrysotoxum*, and not to *Xanthogramma*, which have short yellow antennae. This translation has been confirmed by a Latin scholar, Howard Don Cameron, with whom it has been queried by Dr F.C. Thompson. Verrall (1901, p. 647) also cited another part of Linnaeus's description of *M. festiva* in support of his identification of the name, i.e. 'abdomen arcubus quatuor flavis interruptis', referring to the presence of four interrupted yellow bands; this is a characteristic of the *Chrysotoxum* species while *Xanthogramma citrofasciatum* De Geer, 1776 has only three interrupted yellow bands on the abdomen.

7. It is the case that Linnaeus placed *M. festiva* in a group of species with short antennae, as indicated by Thompson et al., even though this is contrary to the true meaning of the description. It is well known that many Linnaean species are composites of more than one taxon, and it is possible that Linnaeus applied the name *festiva* to members of both genera, which look very similar in the absence of the head. Moreover, there is no evidence to confirm that the specimens now in the Linnean Society collection were among those on which the description of *M. festiva* was originally based. Elsewhere in their paper, Thompson et al. (1982) indicated instances where the evidence from Linnaeus's descriptions is in conflict with the labelling of specimens, and in those cases they gave priority to the written description. There is ample evidence, some of it mentioned by Thompson et al., that labelling in the Linnean collections cannot be relied on and that specimens were added or altered after 1757 both in Sweden and London (see Day & Fitton, 1978, p. 183, and Løken, Pekkarinen & Rasmont, 1994, p. 233). For example, *Microdon mutabilis* (Linnaeus, 1758) is clearly identifiable from Linnaeus's description but the specimen labelled

mutabilis is of *Sericomyia silentis* (Harris, 1776), a species of completely different appearance, while there is below this a specimen of *mutabilis* with the original head missing and a head of a *Helophilus* species glued in its place (which had been added subsequent to Haliday's examination of the collection in 1847–1848). Thompson et al. (1982, p. 157) selected this specimen, excluding the head, as the lectotype of *mutabilis*. While there is no certainty that specimens had been substituted for the original types of *Musca festiva*, this cannot be excluded in view of the differences in antennal length and coloration and in abdominal markings from Linnaeus's description.

8. The transfer of the specific name of *Musca festiva* to a *Xanthogramma* species is complicated by the identity of *Musca citrofasciata* De Geer (1776, p. 118), because of the citation by De Geer of *Musca festiva* Linnaeus as an apparent synonym of his new name. This was done, as with fourteen other cases of species described as new by De Geer in the same work, by repeating part of Linnaeus's diagnosis of *festiva* immediately after the short Latin description of his own species *citrofasciata*. In the case of *Musca citrofasciata* the diagnosis given for *festiva* is comparable, but not identically worded, to that of *citrofasciata*. According to Thompson & Pont (1994, p. 62) *citrofasciata* was proposed as a new substitute name for *festiva*. Thompson et al. (1982, p. 155) supported this conclusion by referring to De Geer's personal association with Linnaeus and his knowledge of Linnaeus's collections. However, De Geer did not state, as has been suggested, that the names applied to the same species and he did not give any reasons for mentioning *M. festiva* Linnaeus when discussing his species *M. citrofasciata*, but it was probably for purposes of comparison. We do not accept as valid the argument that the names *festiva* and *citrofasciata* must apply to the same species, because it is clear that De Geer was describing *M. citrofasciata* as a new biological species and not simply proposing a new name for *festiva* of Linnaeus. The brief Latin diagnoses given by De Geer do not mention the colour or length of the antennae under either name, but the more detailed French description of *M. citrofasciata* states 'antennes rousses, à palette courte arrondie avec un poil simple', thus eliminating, both on colour and length, the possibility that De Geer was dealing with a *Chrysotoxum* species. Thompson et al. (1982, p. 156) referred to the confusion among earlier authors about the application of the name *festiva*, noting that Illiger (1807, p. 450) first drew attention to this. Because Illiger supposed *citrofasciata* to have been a new name for *festiva*, which he believed to be a species with long antennae (i.e. a *Chrysotoxum*), he proposed the name *Musca philanthina* for the *Xanthogramma* species. If the view of Thompson & Pont (1994) were accepted, then *X. philanthinum* (Illiger) would be an available name for *X. citrofasciatum* auct. but we do not suggest its introduction.

9. De Geer (1776) cited Linnaean names following his own diagnoses of fifteen of the Diptera species described as new by him. In all these cases, Thompson & Pont (1994) regarded De Geer's name as synonymous with the Linnaean name. In some intances, e.g. *M. rosae* De Geer and *M. pyrastri* Linnaeus (see Chandler, 1998a, p. 97) this is evidently correct, but in other cases (e.g. two examples concerning species now in the TEPHRITIDAE, discussed in Chandler (1998b)) it is clearly not so. Many of De Geer's descriptions were based on specimens reared by him and there is no question that he intended his names for newly described species and not as replacement ones for Linnaean species. We therefore consider that the established position of the name

Musca citrofasciata De Geer as a *Xanthogramma* does not affect the generic assignment of the name *Musca festiva* Linnaeus.

10. Since Thompson et al. proposed changes in application of the Linnaean names *arcuata* and *festiva* there has been confusion in the literature. Authors who have accepted these changes are Torp (1984, 1994), Kormann (1988), Speight (1990, 1993), Speight & Lucas (1992), Daccordi (1995), Schmid (1995), Holinka & Mazánek (1997), Maibach, Goeldlin de Tiefenau & Dirickx (1998) and Ssymank et al. (1999). Recent authors who have maintained the long traditional usage of these names include Stubbs & Falk (1983), Dusek & Láska (1987), Peck (1988), Verlinden (1991), Soszynski (1991), Stubbs (1996) and Howarth et al. (2000), although it has to be accepted that the *Catalogue of Palaearctic Diptera* by Peck (1988) was complete only to the end of 1982 and the paper by Thompson et al. was not cited. The traditional usage of the names was also maintained in the British and Irish Check List (Chandler, 1998b), pending the present application. In recent works which mention only *C. arcuatum* it is often not possible to be certain what species is intended. In Britain there has been some particular confusion because Whiteley (1988, p. 46) followed the change in *Xanthogramma* but not in *Chrysotoxum*, and this has resulted in the use of the name *festivum* in both genera by the British Hoverfly Recording Scheme (Ball & Morris, 1992, pp. 16, 19).

11. In passing, it should be noted that the name *festiva* becomes *festivum* in combination with both *Xanthogramma* and *Chrysotoxum* as both generic names have neuter gender. *Xanthogramma* is based on the Greek neuter noun *gramma*, but has sometimes been treated as feminine in error. Thompson et al. (1982, p. 155) gave this correctly in their text, but their Abstract (p. 150) gave *X. festiva*, which was repeated by Whiteley (1988, p. 46).

12. While it is possible (see para. 4 above) that the name *Musca arcuata* Linnaeus, 1758 may have originally referred (at least in part) to *Chrysotoxum festivum* of Verrall (1901, p. 650) and most subsequent authors, the transfer of the name to this species by Thompson et al. (1982) is not considered justified because of the confusion that has resulted, and which continues. It is also considered unnecessary because of the conclusion reached by Iliff (1995, p. 9), and discussed above, that *Musca festiva* Linnaeus, 1758 was indeed a *Chrysotoxum* species and not a *Xanthogramma* as supposed by Thompson et al. We therefore urge the maintenance of *C. festivum* in its traditional sense, and also that of *Xanthogramma citrofasciatum*. The name *Musca fasciata* Müller, 1764 is not considered to be unequivocally identified with *Chrysotoxum arcuatum* auct. (see para. 5 above), and we believe it most desirable to maintain the name *arcuatum* in the sense used by Verrall (1901) and most subsequent authors.

13. We propose, in accordance with Article 75.6 of the Code, that the extensive confusion caused by the transfer of names between species, as described in para. 2 above, should be avoided by the designation of neotypes for *Musca arcuata* and *M. festiva* Linnaeus, 1758 which accord with the usage of those names which has prevailed for a century or more. This will also conserve the usage of *Xanthogramma citrofasciatum* (De Geer, 1776). As outlined above, we do not believe it certain that the lectotypes designated by Thompson, Vockeroth & Speight (1982) were demonstrably syntypes, and even if they were their adoption is the cause of the confusion. We note that exactly similar considerations led the Commission to designate

neotypes, in accordance with the prevailing usage of names, for the Linnaean bumblebee species *Bombus muscorum* and *B. terrestris* (Opinion 1828, *BZN* **53**: 64–65, March 1996). As the neotype of *M. arcuata* we propose a male specimen from Voss (S.W. Norway) collected by A.E. Stubbs (30.vii 2.viii. 1977), and for that of *M. festiva* we propose a male specimen (B.M 1937 -539) from Schneverdingen (Lüneberg Heath, N. Germany) collected by T.H. Rowsell and B.J. Clifton (5.vii.1937); both are in The Natural History Museum, London, and have been marked 'NEOTYPE, det. P.J. Chandler, 31.3.2000'.

14. The International Commission on Zoological Nomenclature is accordingly asked:

(1) to use its plenary power to suppress all previous type fixations for the nominal species *Musca arcuata* Linnaeus, 1758 and *Musca festiva* Linnaeus, 1758, and to designate as the respective neotypes the specimens mentioned in para. 13 above;

(2) to place the following names on the Official List of Specific Names in Zoology:
  (a) *arcuata* Linnaeus, 1758 as published in the binomen *Musca arcuata* and as defined by the neotype designated in (1) above;
  (b) *festiva* Linnaeus, 1758 as published in the binomen *Musca festiva* and as defined by the neotype designated in (1) above.

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